Abstract Submitted
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Thermally aware, durable nanoengineered surfaces with high speed liquid impalement resistance[1] MANISH TIWARI, CHAOYI PENG, ZHUYANG CHEN, Nanoengineered Systems Laboratory, UCL Mechanical Engineering, University College London, London WC1E 7JE, UK — Highly hydrophobic nanoengineered surfaces delaying freezing down to -20 degrees Centigrade for a day, sustaining dropwise steam condensation under high rate steam shear for several days, sustaining mechanical abrasion and high strains have attracted strong interest recently. Particularly, anti-icing and dropwise condensation promotion require thermally conductive surfaces with careful nucleation control – of ice germs or droplets, respectively – using precise surface nanotexture. Scalability of surface manufacture is an additional challenge. In the current presentation, we will demonstrate a pathway to address these needs. Anodisation of metallic substrate is first used to obtain nanotextured surfaces with a precision of approx. 200 nm. Next, rationally formulated nanocomposites comprising solution processed fluorinated copolymers and nanoparticle dispersions were spray coated on the anodized metals. The resulting nanocomposite coatings were superhydrophobic with approx. 20 nm precision in surface texture. The surface durability is assessed using tape peel, sand abrasion, and droplet and water jet impact tests up to 30 m/s. High speed jet splashing is recorded at speeds >10 m/s to demonstrate the influence of jet diameter on splashing characteristics.

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